

## CONSTRUCTION SPECIFICATION

### **899. WETLAND CREATION, ENHANCEMENT, AND RESTORATION**

#### **1. SCOPE**

The work shall consist of activities involved with restoring, creating or enhancing wetlands. The scope of work shall also include erosion and sediment controls, dewatering activities for construction and irrigating for plant establishment.

#### **2. RESTRICTIONS**

Work shall be performed only when water and soil conditions are favorable for such operations. Operations will be suspended or postponed whenever conditions are unfavorable for such work.

#### **3. GENERAL**

Construction activities shall be carried out so that any existing wetland areas shall be disturbed as little as possible. Timing and use of equipment shall be appropriate for the site and soil conditions.

#### **4. EROSION AND POLLUTION CONTROL**

Construction operations shall be carried out in such a manner that water pollution and soil erosion shall be minimized. Construction Specification Pollution Control (5) shall be followed. The Contractor shall install soil erosion and sediment control devices, per the plans and specifications, prior to soil disturbing activities. All soil erosion and sediment control devices shall be properly maintained and repaired or replaced, as necessary. When necessary for planting or seeding, removal of water from the construction site shall be accomplished in accordance with Practice Standard Dewatering (813) and in such a manner that erosion and the transmission of sediment and other pollutants are minimized.

Temporary soil stabilization will be completed in conformance with guidelines provided in Practice Standards Mulching (875), Erosion Control Blanket (830), Turf Reinforcement Mat (831), Polyacrylamide (PAM) for Temporary Soil Stabilization (893) and any applicable construction or material specifications and standard drawings.

#### **5. SUBSURFACE DRAIN ABANDONMENT, PLUGGING OR REMOVAL**

If included as part of the planned project, subsurface drains shall be modified, removed, or abandoned as shown on the plans. All envelope filter material or other flow enhancing material shall be removed. The trench shall be backfilled in 12 inch layers and compacted with similar soil to obtain a density of not less than the adjacent natural soils.

The ends of the abandoned and disconnected drains shall be blocked with

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manufactured caps or plugs or with concrete. Any additional subsurface drains located during construction shall be brought to the attention of the landowner. For any subsurface drainage alterations, the upstream drainage must be maintained at its current capacity.

#### **6. EMBANKMENT**

If an embankment is needed as part of the water control, the foundation area shall be cleared of trees, logs, stumps, roots, brush, boulders, sod and rubbish. Topsoil and sod shall be stripped to a depth of six inches, stockpiled and spread on the completed embankment. Foundation surfaces shall be sloped no steeper than 1.5 horizontal to 1 vertical unless shown otherwise on the drawings. The foundation area shall be thoroughly scarified before placing fill material.

All trees and shrubs shall be cleared and grubbed within a minimum distance of 10 feet from an embankment.

All excavations shall be dug to the lines and grades shown on the drawings or completed as staked in the field. Structure or trench excavations shall conform to all safety requirements of OSHA.

Suitable excavated materials may be used in the permanent fill as needed. All surplus or waste material shall be disposed of only in areas shown on the drawings. The waste material shall be smoothed and sloped to provide drainage.

Borrow should not be taken from the wetland area within 10 feet of the embankment or as shown on the plans.

Fill material shall be free of detrimental amounts of sod, roots, frozen soil and stones more than 6 inches in diameter, or other objectionable material. The moisture content of the fill material shall be such that a ball formed with the hands does not crack or separate when struck sharply with a pencil and will easily ribbon out between the thumb and finger. Material that is too wet shall be dried, and material that is too dry shall have water added and mixed until the requirement is met. The placing and spreading of fill material shall be started at the lowest point of the foundation and the fill brought up in horizontal layers not to exceed 9 inches in thickness prior to compaction.

Earth fill shall be compacted by one of the following methods as specified on the plans. If no method is specified, compaction will be Method 1.

Method 1 – Earth fill shall be placed so that the wheels of the loaded, rubber-tired, hauling equipment traveling in a direction parallel to the centerline of fill pass over the entire surface of the layer being placed.

Method 2 – Two complete passes of a tamping-type roller will be made over each

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layer. The roller shall be capable of exerting a minimum of 100 pounds per square inch.

Minimum density shall be 90% of the maximum density as determined by ASTM D-698.

The completed work shall conform to the lines, grades and elevations shown on the drawings or as staked in the field. Construction Specification 752 STRIPPING, STOCKPILING, SITE PREPARATION AND SPREADING TOPSOIL shall be followed where appropriate.

### **7. WATER CONTROL STRUCTURE**

If proposed, the water control structure shall be installed to the elevation shown on the drawings. Excavations below grade shall be corrected by backfilling and compacting by hand-operated or power equipment.

Equipment shall not be operated within 2 feet of any structure or pipe. Fill adjacent to structures, pipe conduits and anti-seep collars shall be placed in 4 inch layers and compacted to a density equivalent to that of the surrounding fill by means of hand tamping or manually directed power tampers. Care should be taken that compaction around the spillway pipe does not cause uplift on the pipe with a resulting void beneath the pipe. Only hand tamping should be used to compact the fill under the bottom half of the pipe.

Any conduits (e.g. pipe) installed in a trench shall be bedded and backfilled throughout the width of the embankment. Broken pieces of clay tile shall be kept away from the conduit. Friable soil shall be placed in 4 inch lifts and hand tamped to a depth of 2 feet above the conduit. The sides of the remaining trench under the embankment shall be sloped no steeper than 3 horizontal to 1 vertical and backfilled meeting embankment requirements.

Once the control structure is operational, it must be operated in a manner that provides sufficient water to insure the wetland is functioning. Enough moisture must be present in the wetland to keep the vegetation community functioning.

### **8. SEED AND PLANT MATERIALS**

Species shall be adapted to soil, ecological sites, and climatic conditions. Species planted shall be suitable for the planned purpose and site conditions. Vegetative planting material (e.g. plugs, rhizomes, bulbs) shall be from a reliable supplier. Plants shall be sound, healthy, vigorous and free of disease, insect pests and larvae, with well-developed root systems. Woody plants shall meet applicable standards set forth by the American Nurserymen's Association.

Seed will be clean and free of weed seed and other contaminants. Wet, moldy or

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otherwise damaged seed will not be acceptable. Seed shall be cleaned to the bare caryopsis, or as close to the bare caryopsis as possibly without damaging seed viability. Canada wild rye (*Elymus canadensis*) is an exception because it loses viability rapidly when it is de-awned. All seed used shall provide Pure Live Seed (PLS) data so that seeding rates can be determined to compensate for viability, purity, and other factors.

$$\% \text{ pure live seed (PLS)} = \frac{\% \text{ total viable germination} \times \% \text{ purity}}{100}$$

Where total viable germination includes both seed germination and dormant seed (viability test).

All legumes not pre-inoculated will be inoculated with a pure culture of nitrogen-fixing bacteria, specifically formulated for the species, within 12 hours of seeding.

Protect all planting stock from desiccation during transport and on-site storage. Keep all planting stock, except that needed immediately for planting, stored in a cool environment out of direct sunlight and wind. Keep plants moist if being held for an extended period of time. This includes bare root stock, plugs, rhizomes, bulbs, root stock, seed, and other propagules.

### **9. SOIL PREPARATION**

Prepare a firm seedbed for all planting methods, and as consistent with the project goals. Tillage may be necessary for a wetland creation project, but may be detrimental to a wetland enhancement project. In most cases a no-till method should be favored to reduce soil erosion, and disturbance that invites invasive species. The seed of most native wetland species is small compared to upland prairie native species. And generally, the smaller the seed, the shallower it must be sown. In addition, many native species require light for germination, or wetland species may be adapted to float to optimal germination conditions. Therefore, while some native species, especially grasses, can be sown using a drill, many species should be broadcast onto the prepared soil surface.

For bare earth seeding, remove stones, roots, and sticks prior to seedbed preparation activities. Prepare the seedbed with a disk or unique rake (harrow) to reduce clod size to a maximum diameter of 2-inches and eliminate rivulets, gullies, crusting, and caking. The disk shall be in good condition with sound, unbroken blades and weighted as necessary to achieve a minimum 3-inch tillage depth. Working wet soils shall not be conducted. Following these seedbed preparation activities, the ground surface shall have minimum compaction, be smooth and level, and be free of debris to promote good seed-soil contact.

Site preparation shall be sufficiently adequate to eliminate weeds for establishment and

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growth of desired species. Use of an herbicide maybe needed in order to kill existing or selected vegetation, if it would reduce successful establishment of the desired wetland vegetation. Land that has been in grass for many years usually has a thick residue layer on the soil surface. To allow for the best no-till seedbed this residue must be removed. Three options are: (1) grazing; (2) mowing with residue removed; and (3) prescribed burn. In the fall, an herbicide can be also applied to prepare for a spring no-till seeding. An additional spring herbicide application may be required, depending on plant growth.

### **10. SEEDING AND PLANTING**

Seeding and planting can be accomplished using a variety of methods, and in combination depending on the desired wetland species and the specific goals of the project. Vegetation must be planted according to the planting design and schedule. Plant species, size, and spacing must conform to the planting schedule. Any substitutions must be approved by the designer or landowner.

No seed shall be sown during high winds, rain events, or when the ground is not in a proper condition for seeding, nor shall seed be sown until the purity test has been completed for the seeds to be used, and shows that the seed meets local or state noxious weed seed requirements.

Prior to starting work, seeders, trailers, and interseeders shall be cleaned (free of any previous seed, soil, or plant material, including tires), calibrated and adjusted to sow seeds at the required seeding rate. Equipment shall be operated in a manner to ensure complete coverage of the entire area to be seeded or interseeded.

If site conditions are too wet to physically access the permanent seeding areas with a tractor and native seed drill or spreader without rutting and/or otherwise altering the proposed seeding and planting surface, an ATV or similar type equipment equipped with a broadcast seeder may be a viable seed installation alternative. The broadcast seeder shall not rut and/or otherwise alter the proposed restoration area seeding and planting surface.

**Seed Broadcast:** The prepared seedbed should contain enough fine soil particles for uniform shallow coverage of the seed as well as contact with moisture and nutrients. Broadcast seed at the specified rate and roll or cultipack after seeding.

**No-Till:** For no-till seeding, use of a "No-till" drill (e.g. rangeland drill) reduces the exposure of the newly seeded site to erosion. A no-till drill may also be used to seed sites with existing desirable vegetation and where no bare soil surface is prepared. A drill should be selected that can handle a wide variety of seed (fluffy, smooth, large, and small) and low seeding rates. Plant seed to a depth of one-quarter to one-half inch deep. Some feed tubes may be disconnected to put seed on the soil surface for species needing light for germination.

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Hydroseeding: Seed, fertilizer and lime may be applied together using no more than 125 pounds of solids per 100 gallons of water. If legume seed is hydroseeded, triple the recommended rate of inoculant. Hydrated lime will not be used in a slurry mix.

Live Plantings: The specific planting locations for the rootstocks, seedlings and vegetative propagules should be shown on the plans. If locations are not designated, the live plant materials should be planted and distributed randomly within the specific plant community following natural grouping, spacing and distribution patterns. The plant pits shall be an appropriate size to accommodate the actual size of individual plant material.

Plug stock must be planted upright and at a depth such that the natural soil just covers the top of the root crown to prevent drying out of planting medium. Firmly pack soil around roots to eliminate air pockets. Properly planted plugs should resist gentle lifting pressure.

Container stock must be handled by moving the container, not by grasping the stem. Remove plants from containers before placing in the ground. Loosen fibrous roots and straighten or cut all encircling roots to avoid future girdling problems. If plants are in paper pots, slit along each side or remove before placing in the ground. Place plants so the plant's crown is at or slightly above ground level. Firmly pack soil around roots to eliminate air pockets.

Balled and burlapped vegetation should be planted in a hole 1 ½ times as wide as the root ball. Handle plants by moving the root ball, not grasping the stem. Remove any rope, wire, plastic or twine from the tree. Pull back burlap around trunk and fold once in the hole. Completely remove non-biodegradable material. Straighten or cut all encircling roots to avoid future girdling problems. Place plants at the same depth as in the nursery and on a stable bed to prevent settling. Firmly pack soil around roots to eliminate air pockets. Thoroughly water vegetation after planting until soil is moist to a depth of 4 inches.

Planting dates, planting methods and care in handling and planting of the seed or planting stock shall ensure that planted materials have an acceptable rate of survival. See Table 1 for planting dates. Use stratified seed unless doing a dormant seeding.

- Plant rooted material (plugs, bare root stock) after threat of frost (or a consistent soil temperature of 50° F)
- Fall Dormant Seeding offers an excellent opportunity to establish a diverse stand. Fall seeding tends to favor forbs and there is less competition with other planting activities. Dormant seeding shall be completed according to Table 1 to insure seed will not germinate prematurely.

Table 1 – Acceptable Planting Dates by Plant Suitability Zones (USDA-NRCS, Illinois, April 2003)

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Type of seeding	Plant Suitability Zone <sup>1</sup>	Cool Season Species	Warm Season Species <sup>2</sup>
Spring	I	Late Winter - June 1	Late Winter - June 15
	II	Late Winter - May 15	Late Winter - June 5
	III	Late Winter - May 15	Late Winter - June 1
Late Summer	I	August 1 - September 1	Not Recommended
	II	August 1 - September 10	Not Recommended
	III	August 1 - September 20	Not Recommended
Dormant	I	November 1 - Freeze-up	November 1 - Freeze-up
	II	November 15 - Freeze-up	November 15 - Freeze-up
	III	November 15 - Freeze-up	November 15 - Freeze-up
Frost	I	February 1 - March 15	February 1 - March 15
	II	February 1 - March 1	February 1 - March 1
	III	February 1 - March 1	February 1 - March 1
<sup>1</sup> -Refer to the "Plant Suitability Zones" map located in Section II, IL-eFOTG-Climate Data or refer to the link: <a href="http://efotg.nrcs.usda.gov/references/public/IL/c12plant.pdf">http://efotg.nrcs.usda.gov/references/public/IL/c12plant.pdf</a> . <sup>2</sup> -Dates to be used when warm and cool season natives are planted in mixture.			

**11. TEMPORARY COVER**

A temporary seeding will be completed on those sites where a permanent seeding will not be established within 30 days following installation of a project. All cover crop species shall be non-persistent or native and not allelopathic. Seeding rates shall follow those in the plans and specifications and shall be sufficient to achieve soil erosion control. Companion crops can be used to reduce the amount of erosion on critical sites by including species such as Canada wild rye (*Elymus canadensis*), slender wheatgrass (*Elymus trachycaulus/Agropyron trachycaulum*) and/or sideoats grama (*Bouteloua curtipendula*) in the mixtures where the hydrology and conditions are appropriate.

**12. SUPPLEMENTAL WATERING OF PLANTINGS**

Supplemental watering of seeded areas and live plants may be needed depending on local weather and soil moisture conditions after planting. Supplemental watering of

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seeded areas and live plants shall be performed at least once every 7 days from the date of planting through the month of September, unless determined that it is needed more or less often due to precipitation patterns. Sufficient water will be applied at each watering to thoroughly saturate the soil, but in a manner that does not wash away seed or planted material.

### **13. ESTABLISHMENT**

During the period of establishment, it is essential to properly care for plants to assure maximum possible survival and vigorous healthy growth. Such care will consist of, but not be limited to the following work:

- a. Watering
- b. Weeding
- c. Removal of debris and litter
- d. Application of herbicide to invasives/weeds

Sites will be protected from damage by vehicular and human traffic for a length of time necessary to get the vegetative cover well established but no less than one full growing season. Application of fertilizers is generally not recommended for native wetland plantings as it will promote the growth of weedy species.

In wetlands that are not saturated or with standing water, weeds may also be controlled by mowing or other mechanical means. During the establishment year, mow weeds after they have reached a 12" height. Mow 2–3 times, generally on 30 day intervals from the date of seeding. Mow to a height of 6" to 8". Use a rotary mower or remove the clippings so as not to smother the seedlings. This will slow the weeds but won't harm the wetland plants. Mowing in wetlands should only be used as a management technique where it will not result in rutting of the wetland soil and disturbance of the planting. Spot mowing can also be used to control specific patches of weeds/invasive species where appropriate to reduce seed set.

### **14. MANAGEMENT**

Controlled burns are a widely used ecological management tool. Fall burns and early spring burns tend to favor forbs. Late spring burns provide maximum stimulus to warm season plants and work well to control cool season grasses. Burn when cool season grasses are growing and warm season plants are just beginning to grow. An Open Burning Permit will be needed from the Illinois Environmental Protection Agency. In addition, many local jurisdictions in non-rural areas of the state will require local permitting and coordination. These permits will require the preparation of a prescription burn plan that addresses weather conditions and smoke management.

Burning should not be used until the wetland vegetation has become sufficiently established. Even though native species are adapted to fires, burning too soon after planting will damage the young plant material and set back the wetland project.

Therefore, burning shall not be conducted sooner than 2 years after planting/sowing.



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Undesirable woody vegetation may also be controlled by early spring or fall burning, or cutting/girdling with spot chemical treatment to remove the plant or prevent sprouting. Chemicals used in performing this practice must be Federally, State and locally registered and must be applied in accordance with label directions.

### **15. GUARANTEE**

Prior to the end of the first full growing season inspect the planting areas. At the end of the establishment period, determine the area (to the nearest 0.05 acre or 2100 sq. ft.) that has not been established per the Performance Standards. If a contractor was used inform them in writing of the noncompliance. All areas that have not been established shall be reseeded or planted with live plants within the next appropriate planting period.

### **16. MEASUREMENT AND PAYMENT**

Method 1—For items of work for which specific unit prices are established in the contract, each area seeded is measured and the area calculated to the nearest 0.1 acre. Payment for seeding is made at the contract unit price for the seeding, which will constitute full compensation for completion of the work.

Method 2—For items of work for which specific lump sum prices are established in the contract, the quantity of work will not be measured for payment. Payment for this item is made at the contract lump sum price for the item and will constitute full compensation for the completion of the work.

Compensation for any item of work described in the contract, but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary.

### **17. Vegetation Performance Standards**

Within 3 months of seeding, at least 90% of temporary cover crop and/or permanent vegetation, as measured by aerial coverage, shall be established.

At least 50% of the required minimum number of species shall occur at a 10% frequency or greater, within each plant community zone or area.

No area over the entire created, restored or enhanced wetland area greater than 1 square meter shall be devoid of vegetation, as measured by aerial coverage, unless specified on the plans. This does not apply to emergent and aquatic wetland communities.

Invasive species including but not limited to *Typha angustifolia*, *Typha X glauca*, *Phragmites australis*, *Lythrum salicaria*, *Salix interior* or *Phalaris arundinacea* shall not cumulatively comprise more than 5% of the total percent cover (not relative cover) for

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each community. Other weedy species and non-invasive adventives species should be controlled but may have separate performance standards as appropriate.